Cogeneration facility realizes immediate with Transient Data Manager® 2

Remote balancing pays for new system

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The Midland Cogeneration Venture (MCV) Limited Partnership, consisting of seven partner companies, performed the first successful conversion of an incomplete nuclear power plant to a natural-gas-fueled cogeneration plant. The facility uses twelve 86.2 MW Asea Brown Boveri (ABB) combustion gas turbine generators and a high pressure steam turbine to transform up to 207 million cubic feet of natural gas per day into 1370 MW of electricity. Up to 1.35 million pounds per hour of process steam is also produced for industrial use, primarily at Dow Chemical USA's Michigan Division Complex, located nearby.

Each ABB combustion gas turbine generator has five bearings, each of which is monitored with Bently Nevada XY proximity probes. A Keyphasor® is used for phase reference on each unit. All five bearings are equipped with Seismoprobes on the bearing caps for casing vibration measurement. Two Bently Nevada proximity probes measure axial position. The XY proximity measurements, Keyphasor® and axial position are monitored with Bently Nevada 7200 Series Vibration Monitoring equipment.

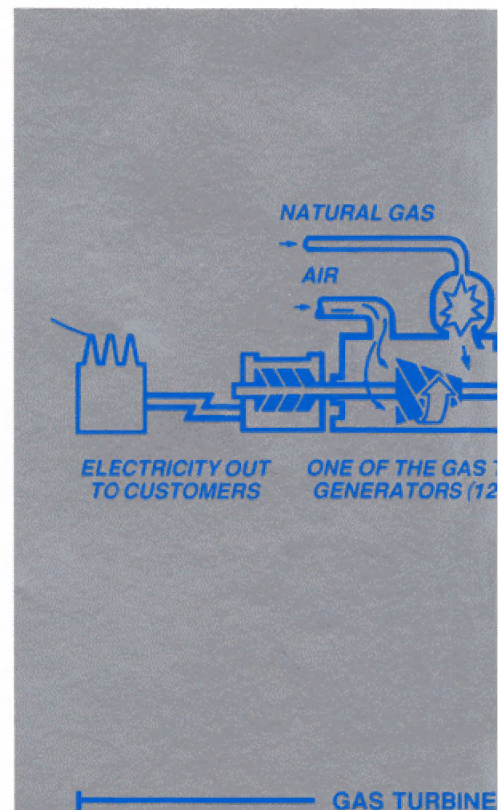Bently Nevada's Machinery Diagnostic Services (MDS) group was asked to take baseline data on all twelve ABB combustion gas turbine generators prior to their scheduled overhaul ("C" inspection). This data collection was done using two Bently Nevada 108 Data Acquisition Instruments (DAI) and Bently Nevada's ADRE® 3 Software.

After baseline data was collected, each unit was torn down, reworked and then reassembled. During startup, the MDS engineer collected data using the 108 DAIs and generated Orbit, Shaft Centerline and Polar plots, which provided the basis for his diagnosis. Alignment and balancing were required. The balance weights were installed, the machine restarted and the process repeated. In most cases, a unit was ready for immediate service after balancing and alignment. Plant personnel then began to balance and align the next unit.

In the summer of 1992, Bently Nevada released Transient Data Manager® 2 Software which has the ability to access the system's dynamic data remotely via a modem. The software eliminates a significant portion of the cost associated with bringing in an MDS Engineer for routine diagnostics.

In January 1993, MCV installed a temporary Bently Nevada 3300 Monitoring System with a Transient Data Manager (TDM) Communications Processor and new TDM2 Remote Access Software. Unit No. 5 was the first unit to use the new system. At MCV's request, MDS was on-site to gather data with the ADRE® 3 System and Bently Nevada's sales engineer provided the recommissioning support for the TDM2. This redundant approach enabled MCV to see the TDM2 System work and to establish a baseline MDS cost to justify the price of a remote monitoring system.

Units 8 & 10 were the next two units to go through a complete disassembly and inspection. Both machines were remotely balanced from a site hundreds of miles away, using TDM2 Remote Access Software. MCV saved $20,000 in travel-related and on-site costs associated with importing a machinery specialist. In six weeks time, the system — a new 3300 Series Monitor, TDM Communications Processor, TDM2 Software and computer — paid for itself. The benefits of the new system were immediate, measurable and substantial.

NATURAL GAS

AIR

ELECTRICITY OUT TO CUSTOMERS

ONE OF THE GAS [...] GENERATORS (12[...])

GAS TURBINE

payback

MCV has also used the TDM2 test system with remote access for periodic evaluation of their other units. This has eliminated the requirement for MCV to bring an MDS engineer on-site to discuss machine "symptoms." The availability of off-site support using on-site data has proven the value of the TDM2 Remote Access Software through cost savings, and more importantly, increased unit availability. ■

Photos & figure courtesy of Midland Cogeneration Venture.

STACKS

STEAM

HOT EXHAUST AIR

E GAS TURBINE ORS (12 TOTAL)

HEAT-RECOVERY STEAM GENERATOR

WATER

EXISTING STEAM TURBINE GENERATORS

ELECTRICITY OU TO CUSTOMERS

STEAM TO DOW

WATER FROM DOW

DOW CHEMICAL

RBINE/HRSG CYCLE

STEAM TURBINE CYCLE